PB87-189064

Superfund Record of Decision (EPA Region 3)
Blosenski Landfill, West Caln Township
Chester County, Pennsylvania, September 1986

(U.S.) Environmental Protection Agency
Washington, DC

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16. ABSTRACT

The Blosenski Landfill site is located on 13.6 acres in West Caln Township, Chester County, PA. The site is bordered by heavily wooded and agricultural areas. Approximately 467 residents live within one mile of the site. Beginning in the 19[illegible] the site operated as a landfill accepting municipal and industrial wastes. In 197[illegible] site was purchased by Mr. Joseph Blosenski, who operated the landfill until the ear[illegible] 1980s. Wastes were randomly dumped on the surface during the operating period, and included solvents, waste water treatment sludges, demolition and construction wastes, undercoating materials and open and leaking drums. Numerous citizen complaints of odors, smoke and airborne debris led to petition and regulatory actions against Mr. Blosenski. In 1982, EPA conducted a Site Inspection and found serious ground water contamination. The primary contaminants of concern are VOCs including benzene, [illegible] and TCE, and inorganics including lead, cadmium, chromium and mercury.

The selected remedial action for the site will be conducted in four phases. Phase [illegible] - installation of a public water supply to 12 residences; Phase 2 - excavation and removal of buried drums and other material with offsite disposal in a RCRA landfill; Phase 3 - perform a pre-design study to further sample ground and surface waters to delineate extent and magnitude of contamination. Based on the results of the study, (See Attached Sheet)

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17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS OPEN ENDED TERMS	c. COSATI Field Group
~~Record of Decision~~ Blosenski Landfill, PA Contaminated Media: gw, soil Key contaminants: VOCs, heavy metals, TCE, benzene, toluene		

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EPA

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Blosenski Landfill, PA

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Blosenski Landfill, PA

16. ABSTRACT (continued)

ground water will be pumped and treated for a maximum of two years to ACLs established by EPA; Phase 4 - install a low permeability RCRA cover on the landfill, divert surface water and construct a gas venting system. Phases 1-3 will be implemented concurrently. Estimated capital cost of the remedy ranges between $11,000,000 and $15,000,000, with a baseline cost of $13,000,000. O&M costs are estimated to be $534,300 for the first two years.

RECORD OF DECISION
REMEDIAL ALTERNATIVE DECISION

Site: Blosenski Landfill, West Caln Township, Chester County, Pennsylvania

Documents Reviewed:

I am basing my decision principally on the following documents describing the analysis of cost effectiveness and feasibility of remedial alternatives for the Blosenski Landfill Site:

- "Remedial Investigation Report and Feasibility Study" Blosenski Landfill Site, Chester County, Pennsylvania (NUS Corporation, February, 1986)
- "Focused Feasibility Study" Blosenski Site (PRC Engineering, February 27, 1986)
- Staff summaries and recommendations
- Recommendation by the Pennsylvania Department of Environmental Resources.

Description of Selected Remedy:

The Selected Remedy will be performed in a phased approach, with the first three of the four phases being performed concurrently.

Phase 1

Install a public water supply line to an estimated twelve (12) residences. The water will be provided by the Coatesville Water Authority. EPA will pay for the initial connections to these residences.

Phase 2

Excavate and remove buried drums in areas identified during EPA's Remedial Investigation and any material in intimate contact with the drums and free standing liquid, and dispose of these materials at a Resource Conservation and Recovery Act (RCRA) facility. In addition, EPA will perform trenching operations throughout other areas of the Site in order to identify, excavate and dispose of other buried drums.

Phase 3

Perform a pre-design study which shall include further sampling of residential wells, surface waters, and the installation of additional monitoring wells and conducting pump testing to more fully delineate the extent and magnitude of the ground water contamination. This study will also be used to collect data for the design of an effective ground water pumping and treatment system.

Site Description and Summary of Remedial Alternative Selection For The Blosenski Landfill Site

Site Location and Description

The Blosenski Landfill Site is located on 13.6 acres in West Caln Township, Chester County, Pennsylvania. It is surrounded by heavily wooded areas to the north and west, and by agricultural areas to the east and northwest. Approximately 30 residents live within a quarter-mile radius of the site. According to a dwelling count performed on the Honeybrook 7.5-minute series topographic map, approximately 467 residents live within 1 mile of the site. The Pennsylvania Department of Environmental Resources (PADER) estimates indicate that 600 residents live within 3 miles of the site. The closest dwelling to the site is the house trailer located adjacent to the site on the southern perimeter.

The land surrounding the Blosenski Landfill Site is primarily deciduous forest and cropland. The land is used for agricultural, residential, and commercial purposes. A service station is located south of the site, across Kings Highway. Numerous private homes are located along Kings Highway, to the south, and along Cambridge Road, which lies northeast of the site. There are also residences north of the site on Coffroath Road which extends east from Kings Highway and intersects Cambridge Road northeast of the site (see Figure 1). Wooded areas are located between Coffroath Road and the northern border of the site, and also to the west of the site. Agricultural areas lie within one-quarter mile of the site, both to the northwest and to the east. A trailer park is located three-quarters of a mile to the north, and the Sandy Hill Church and School and the Kings Highway Elementary School are located within 2 miles of the site, to the southeast and east, respectively.

An intermittent, unnamed tributary of Indian Spring Run is approximately 500 feet north of the site. This tributary runs about 2 miles to the west before joining Indian Spring Run. Indian Spring Run joins Pequea Creek about 3.5 miles west of the site. Pequea Creek eventually flows into the Susquehanna River, approximately 30 miles southwest of the site.

Site History

Beginning in the 1950's, the landfill was reportedly operated for the disposal of municipal and industrial wastes. Aerial photography for that period, however, indicates that visible landfill activity began between 1951 and 1957. No specific information is available about site operations from that period until the landfill was purchased in 1971 by Mr. Joseph M. Blosenski, Jr.. From that time, until operations ceased in the late 1970s to early 1980s, wastes accepted at the site were apparently dumped on the surface, as evidenced by mounding of the landfill surface. Wastes, which reportedly included drummed industrial wastes, truckloads of sludges, and municipal and commercial refuse, were dumped randomly at the site. The various disposed wastes were not segregated, and the area was not lined. Materials reported to have been disposed on site include solvents, paints, undercoating materials, wastewater treatment sludges, cans of joint cement/sealer, demolition and construction waste, wallboard and plaster, concrete block, waste from land clearing, paper, wooden pallets, cans, open and leaking drums (near the southeast corner of the landfill), old vehicles, and leaking tankers (at the western portion of the landfill).

Aerial photography of the site from 1957 to 1983 showed various operating and junked vehicles on site, including cars, bulldozers, tank trucks, and open-bed garbage trucks. Ground stains and dark-toned standing liquid were evident throughout the site area. A berm running along the northern perimeter of the site was visible in earlier photos, with standing liquid at its base. In a 1969 aerial photo, a trench, possibly excavated to prevent leachate and runoff from leaving the site, was visible extending from the northeastern corner of the fill area to the northeastern corner of the site. A trench north of the fill area on the western portion of the site was also evident in a 1971 photo. In the 1969 photo, possible leachate stains lead down the eastern slope of the fill area to a pit at its base, and several other pits were visible over the site. A tank truck apparently discharging a dark liquid could also be seen in this photo.

In the 1975 photo, the fill area appeared to be covered with earthen material, except in the northwestern and southeastern sections. A ditch, which apparently carried runoff to the southwestern corner of the site, bordered the fill area on the south. Refuse was visible on the east face of the fill area as well as southeast of this area. Throughout the years, the landfill area expanded to the west, east and southeast. Much of it was revegetated, and the trenches and ditches evident in earlier photos became less distinct. By 1983, after the site ceased operations, ground stains were visible only intermittently across the site, mounded material was apparent along the center, and some grading of the soil was evident to the east.

Over the years of operation, nearby residents registered numerous complaints of odors, smoke, and airborne debris arising from open burning of trash at the site. There is a lengthy list of regulatory actions against the owner, including site inspections, consent decree negotiations and violations, summary hearings, contempt petitions, and closure orders by the Pennsylvania Department of Environmental Resources (PADER). Numerous permit applications for operation of the landfill were filed by Mr. Blosenski, but a permit was never granted.

Four monitoring wells were installed along the northern property line in the summer of 1982 by PADER's consultant, Robert H. McKinney, Jr., Associates, Inc. However, three of these wells were apparently destroyed in the spring of 1983 and cannot be used. During the winter of 1982, 50 to 60 drums and a leaking tank truck were removed from the site. Currently the property is not fenced.

As part of the initial screening of potential sites under Superfund, a Site Inspection was conducted by EPA at the landfill on April 20, 1982. The results of the inspection revealed serious ground water contamination at the site. As a result of this Site Inspection, a Hazard Ranking

The hydrogeological study performed during the RI was supplemented by the geologic investigation and also involved the installation and sampling of monitoring wells. These wells were placed on the perimeter of the landfill and at upgradient and downgradient locations. Figure 2 shows the location of the monitoring and residential wells and includes the results of analyses of ground water samples for HSL compunds. These wells were then used to observe ground water gradients and fluctuations in water levels over the course of the study. The wells also served as a means to perform hydraulic conductivity testing of the aquifer in localized areas.

Samples of the ground water were obtained from these wells on several occasions throughout the RI, as well as from residential wells in the area, for analysis of Hazardous Substance List (HSL) compounds and other water quality indicators.

Numerous HSL volatile organics were detected in ground water collected from both monitoring and residential wells in and around the Blosenski Landfill site. Volatile contaminants detected in ground water samples include some contaminants identified in surface and subsurface samples and some not detected in other environmental media at this site. Contaminants identified in the ground water and their maximum concentrations encountered in monitoring wells are listed in Table 1. Contaminants identified in residential wells are listed in Table 2.

Table 1.0

Monitoring Wells Samples

Chemical	Maximum Concentration (ppb)*
benzene	11,000
toluene	600
ethylbenzene	54
total xylenes	78
chlorobenzene	34
1,1,1-trichloroethane	430
1,2-dichloroethane	74
1,1-dichloroethane	270
chloroethane	93
tetrachloroethene	5
trichloroethene	260
1,2-dichloroethene	890
1,1-dichloroethene	21
vinyl chloride	450
chloroform	270
methylene chloride	2,000
acetone	43,000
2-butanone	350
2-hexanone	21
4-methyl-2-pentanone	7

*parts per billion

Table 2.0

(3) Residential Well Samples

Chemical	Maximum Concentration (ppb)
1,2-dichloroethene	18
trichloroethene	260
1,1,1-trichloroethane	26
Benzene	14

A total of 29 residences in the vicinity of the site were sampled during the RI. Of those sampled, 3 residences that are situated adjacent to the site (to the south) showed some type of significant volatile organic contamination in their wells. Five other residential wells in the general vicinity of the site showed some type of low level contamination with either volatile organic or inorganic compounds.

Figure 2 presents the results of various organic compounds analyses for the sampling rounds conducted in late 1984 and early 1985. The figure reveals that high levels of contamination are evident at several well locations.

HSL compounds were detected in a number of surficial soil samples collected on and in the immediate vicinity of the Blosenski Landfill Site. Surface soil samples were taken from the top six inches of soil at 22 locations. Nine of the soil samples were taken from the embankment on the north side of the landfill area, where surface leachate had been detected. Chemicals detected and maximum concentrations encountered are presented in Table 3 below.

Table 3

HSL Compounds in Surficial Soil Samples

Volatile Organics

Chemical	Maximum Concentration (ppb)*
benzene	12
toluene	4,000
total xylenes	1,100
ethylbenzene	500
1,1,1-trichloroethane	390
1,1-dichloroethane	20
tetrachloroethene	110
trichloroethene	8
1,2-dichloroethene	29
methylene chloride	1,300
acetone	850
2-butanone	1,000
4-methyl-2-pentanone	110

*ppb = parts per billion

The subsurface investigation performed during the RI was intended to specify the areas in which drum burial had taken place. A total of 22 test pits were excavated throughout the landfill area (Figure 3). Of these, buried drums were found in test pits TP-5, TP-6, TP-11, TP-17, and TP-18. These pits were located on the southern, western, and eastern portions of the landfill.

Subsurface soil samples were obtained from both well borings and test pits. During excavation, buried drums were found in test pits TP-5, TP-6, TP-11, TP-17, and TP-18. These drums were all either crushed or broken open. Black perched water was found during excavation of test pits TP-11, TP-12, and TP-13. Test pit samples included solid and liquid drum contents, subsurface soil, and perched water. Typical HSL compounds detected in well borings and test pits samples (which included drum wastes and leachate) are presented in Table 4.

Table 4

Subsurface Media Contamination (Volatile Organics)

Chemical	Maximum Concentration (ppb)*
benzene	2,000
toluene	5,900,000**
ethylbenzene	15,400,000**
total xylenes	61,000,000**
1,1-dichloroethane	120
chloroethane	2,030
trichloroethene	860
methylene chloride	4,900
2-hexanone	100

* ppb - ug/kg for solid samples; ug/l for liquid samples
**maximum concentration present in waste samples from buried drums

Table 4 (continued)

Semi-Volatiles

Chemical	Maximum Concentration (ppb)
phthalate esters (drum solid)	5,260,000
naphthalene (drum liquid)	200,000
polynuclear aromatics (well borings)	79,200
bis (2-ethylhexyl) phthalate (drum liquid)	196,000
PCB 1254 (drum liquid)	2,900
PCB 1221 (drum liquid)	1,900
PCB 1232 (drum liquid)	2,000
toxaphene (drum liquid)	13,000
1,2,4-trichlorobenzene (well borings)	39,600
1,3-dichlorobenzene (well borings)	39,600
bis (2-chloroisopropyl) ether (well borings)	5,500
2,4-dinitrotoluene (well borings)	39,000
VTIC (soil)*	14,000,000
SVTIC (soil)**	3,500,000

*Volatile Fraction-Tentatively Identified Compounds
**Semi-Volatile Fraction-Tentatively Identified Compounds

(Inorganics)

Chemical	Maximum Concentration (ppb)
Pb (lead) (drum solid)	633,000
Cd (Cadmium) (drum solid)	54,000
Cr (Chromium) (drum solid)	172,000
Hg (Mercury) (well borings)	2,000

Chemical analytical results indicate contamination in the following areas:

- Subsurface media in the vicinity of test pits TP-11, TP-12, and TP-13, located in the eastern portion of the site.
- Subsurface soil in the vicinity of MW 2-1.
- Subsurface soil in the vicinity of MW 3-1.

Remaining subsurface samples were contaminated with only low levels of toluene and/or methylene chloride and do not indicate that these sampling locations are in the immediate proximity of major sources.

The U.S. Fish and Wildlife Service (USFWS) conducted a field investigation downstream of the Blosenski Landfill in April 1984. The investigation involved the collection of fish specimens from two locations. The first fish specimens were collected approximately 400 meters west of the site in the unnamed tributary that the site runoff drains into. The second fish specimens were collected at approximately 1.8 kilometers west of the site, downstream from the first location. The native fish (brook trout, suckers and dace) were submitted for analyses for selected metals, pesticides, PCBs and pathological examination.

The results of the inorganic analyses indicated that most of the inorganics tested for were either not detected or within expected ranges. Analyses for pesticides found low level concentrations of toxaphene which was believed not to indicate a significant hazard to fish and wildlife resources. Toxaphene was found on-site during the RI at 13,000 ppb in a a liquid drum sample. PCBs were detected at 0.44 and 1.3 parts per million (ppm) in fish samples. While the levels detected in the brook trout samples are currently below the Food and Drug Administration action level of 2 ppm (edible portion), it exceeds the National Academy of Science/National Academy of Engineering Criteria of 0.5 ppm in whole fish established to protect fish eating wildlife.

Based upon fish collections, fish flesh analysis, and the pathological examination of fish, the USFWS concluded that contaminants leaching from the landfill are not causing significant adverse impacts to downstream fish and wildlife at this time. This conclusion was viewed in light of the fact that they did not test for HSL compounds, and the fact that although the fish population appeared to be healthy and the individual fish appeared to be in good health, the fish downstream are exhibiting some signs of stess that could be caused by environmental contaminants.

The USFWS recommended that the levels of PCBs in the samples are high enough to warrant further sampling by EPA to determine if they are coming from the Blosenski landfill. The USFWS was also concerned that although there does not appear to be a significant contaminant problem downstream of the site at present, contaminants that are now at the site could move off and enter the aquatic environment at some time in the future.

Transport through ground water is the most significant mechanism of contaminant migration at the Blosenski Landfill Site. Contaminants can reach the ground water zone either dissolved in water or as liquid phases immiscible in water (Mackay, et al., 1985). The dominant factor in dissolved contaminant migration within the Chickies Quartzite is advection. This is the process by which solutes are transported by the bulk motion of flowing ground water. These migrating contaminants are also subject to dispersion within the fracture influenced flow system, although dispersion will not significantly alter flow paths at the site.

Information provided by residences reveal that residential well 2 is approximately 25 feet deeper than residential well 1. Samples from residential well 2 have been free of contaminants on all sampling occasions. It seems possible that flow patterns vary with depth, especially under the influence of pumping.

It also appears that biodegradation may play a part in the fate of chemicals at the Blosenski Landfill Site. Among the implications of this is the possibility that the chlorinated ethenes 1,2-dichloroethene and 1,1-dichloroethene may biodegrade to the potentially more toxic vinyl chloride. It is also possible that this substance will appear in residential wells 1 and 3 to the south of the site. For example, although vinyl chloride was not detected in soil and waste samples obtained at the site, it was identified in several ground water samples. A sample from MW-2 contained vinyl chloride at a concentration of 6 ug/l. Samples from downgradient wells such as MW 6-1, MW 7-1, and MW 8-1 contained vinyl chloride at concentrations ranging as high as 450 ug/l. However, the possible existence of a vinyl chloride source cannot be discounted.

In addition to the hydrogeologic studies, surface and subsurface investigations were performed during the RI. The surface investigation included collecting samples of surface soils, water, and sediments, as well as conducting a geophysical survey of the site. The subsurface excavations were performed to locate and confirm the presence of buried drums. The limited scope of the excavations precluded quantifying the extent or origin of buried waste on site. However, the activities resulted in the identification of distinct contaminant source areas in different areas of the site, which added further support to confirming the cause of local ground water contamination.

Air monitoring during the RI resulted in identifying volatile vapors mainly in the areas of the test pits and from the boreholes.

It appears that density difference among contaminants may affect their migration patterns at this site. Trichloroethene and 1,1,1-trichloroethane have been consistently detected in residential well number 1 and 3. These contaminants are the most dense of the various volatiles detected at the site. It is possible that these contaminants descend further into the bedrock near the source and reach flow conduits more readily affected by residential well pumping.

Comparison of the subsurface results with those surface soils reveals that surface and subsurface soil contamination is present in similar areas. Although the test pits did not uncover a large number of buried drums, these results in no way preclude the presence of drums in areas that were not excavated. However, the discovery of drums in three distinct site areas suggest the presence of at least three significant contaminant source areas. Based on the site geology and hydrogeology discussed previously, contaminants emanating from these sources are migrating through subsurface fractures and faults to other onsite and offsite locations.

Several contaminants, most notably n-nitrosodimethylamine and bis(2-chloroethyl) ether, were found in the soils at the site but were not detected in the groundwater. These compounds have high solubilities and are known or suspected carcinogens with high potencies. Their propensity to enter the ground water could increase carcinogenic risks from ingestion over time.

A measure of acute and subchronic (10-day) toxic effects (where a threshold limit may exist) associated with ingestion of ground water was estimated by comparison of the observed concentrations of groundwater contaminants to the Suggested No Adverse Response Levels (SNARLs) guidelines developed by the USEPA Office of Drinking Water for non-regulated contaminants in drinking water.

Benzene and 1,2-dichloroethene exceed the 10-day SNARLs. No contaminants exceeded the 1-day SNARLs. The contaminant concentrations found in onsite monitoring wells do not currently reaching residential wells. However, toxic effects from short-term ingestion of ground water are possible if people were to be exposed to the detected levels at some future time.

Of the contaminants detected in the residential wells, only trichloroethene (TCE) exceeded the SNARLs. TCE (260 ug/l) in residential well no. 1 exceeded both the 10-day and long-term SNARLs. TCE has been found to have a low to moderate oral toxicity in laboratory animals. The predominant physiological response to acute TCE exposure is depression of the central nervous system.

Chronic health effects (where a threshold limit may exist) may result from long-term, repeated ingestion of ground water contaminants. The most relevant criteria for evaluation of chronic health impacts are the SNARLs. Levels of two contaminants, TCE and benzene, exceeded their long-term SNARLs.

Exposure to subthreshold concentrations of the remaining detected contaminants could have associated additive or antagonistic effects. Additive effects are most likely to result from contaminants that induce the same health endpoint by the same toxic mechanism (ICF, Inc., May 1985).

In addition to chronic effects from ingestion, domestic use of ground water (i.e., showering, lawn watering, etc.) could potentially be associated with health impacts. Repeated long-term dermal or inhalation exposure of volatilized contaminants may produce chronic toxic effects.

Studies have shown that a large fraction of highly volatile contaminants in potable water volatilize during shower usage. This results in an inhalation exposure, both to the user of the shower and to other inhabitants of the home as the shower air is distributed (Andelman, May 1985).

In addition to inhalation exposure, the absorption of chemicals in potable water during bathing may be comparable to that from direct ingestion of water (Andelman, May 1985 after Brown et al., 1984).

ESTIMATED CARCINOGENIC RISK ASSOCIATED WITH INGESTION OF GROUNDWATER
BLOSENSKI LANDFILL SITE

Table 5

Contaminant	Monitoring Wells - Carcinogenic Risk/Person (a)			Residential Wells - Carcinogenic Risk/Person (a)		
	Mean Concentration	Minimum Concentration	Maximum Concentration (b)	Mean Concentration	Minimum Concentration	Maximum Concentration (b)
vinyl chloride CAS No. 75-01-4	1.0×10^{-4} @ 209 µg/l	3.0×10^{-6} @ 6 µg/l	2.2×10^{-4} @ 450 µg/l	ND	ND	ND
tetrachloroethene CAS No. 127-18-4	---	---	8.8×10^{-6} @ 5 µg/l	ND	ND	ND
trichloroethene CAS No. 79-01-6	2.0×10^{-5} @ 37 µg/l	2.7×10^{-6} @ 5 µg/l	4.0×10^{-5} @ 74 µg/l	3.2×10^{-5} @ 59 µg/l	1.6×10^{-6} @ 3 µg/l	1.4×10^{-4} @ 260 µg/l
1,1-dichloroethene CAS No. 75-35-4	4.6×10^{-5} @ 11 µg/l	2.5×10^{-5} @ 6 µg/l	8.8×10^{-5} @ 21 µg/l	ND	ND	ND
1,1,1-trichloroethane CAS No. 71-55-6	4.8×10^{-6} @ 105 µg/l	2.3×10^{-7} @ 5 µg/l	2.0×10^{-5} @ 430 µg/l	5.0×10^{-7} @ 11 µg/l	1.8×10^{-7} @ 3.7 µg/l	1.2×10^{-6} @ 26 µg/l
chloroform CAS No. 67-66-3	2.0×10^{-5} @ 101 µg/l	1.2×10^{-5} @ 6 µg/l	5.4×10^{-5} @ 270 µg/l	---	---	4.0×10^{-4} @ 2 µg/l
benzene CAS No. 71-43-2	4.3×10^{-3} @ 2914 µg/l	1.3×10^{-5} @ 9 µg/l	1.6×10^{-2} @ 11,000 µg/l	---	---	2.1×10^{-5} @ 14 µg/l
methylene chloride CAS No. 75-09-2	1.7×10^{-5} @ 941 µg/l	4.6×10^{-7} @ 25 µg/l	3.6×10^{-5} @ 2,000 µg/l	ND	ND	ND

Contaminant	Monitoring Wells - Carcinogenic Risk/Person (a)			Residential Wells - Carcinogenic Risk/Person (a)		
	Mean Concentration	Minimum Concentration	Maximum Concentration (b)	Mean Concentration	Minimum Concentration	Maximum Concentration (b)
arsenic CAS No. 7440-38-2	4.0×10^{-3} @ 9.4 µg/l	4.5×10^{-3} @ 10.6 µg/l	6.0×10^{-3} @ 14 µg/l	5.4×10^{-3} @ 12.7 µg/l	4.7×10^{-3} @ 11 µg/l	6.4×10^{-3} @ 14 µg/l
cadmium CAS No. 7440-43-9	1.3×10^{-3} @ 6 µg/l	1.1×10^{-3} @ 5 µg/l	1.3×10^{-3} @ 6 µg/l	4.5×10^{-4} @ 2 µg/l	2.2×10^{-5} @ 0.1 µg/l	2.4×10^{-3} @ 11 µg/l
chromium(c) CAS No. 7440-47-3	7.5×10^{-3} @ 6.4 µg/l	3.7×10^{-3} @ 3.2 µg/l	1.1×10^{-1} @ 14 µg/l	1.9×10^{-2} @ 16.2 µg/l	3.5×10^{-3} @ 3.0 µg/l	2.5×10^{-2} @ 22 µg/l
nickel CAS No. 7440-02-0	8.9×10^{-4} @ 21 µg/l	3.9×10^{-4} @ 12 µg/l	1.0×10^{-3} @ 32 µg/l	1.2×10^{-3} @ 36 µg/l	1.3×10^{-4} @ 4 µg/l	8.8×10^{-3} @ 267 µg/l
Total Potential Risk	1.8×10^{-2} (1 in 60)	9.7×10^{-3} (1 in 100)	1.3×10^{-1} (1 in 7)	2.8×10^{-2} (1 in 40)	8.4×10^{-3} (1 in 120)	4.3×10^{-2} (1 in 23)

(a) Cancer risk assessments provided for chemicals for which evaluations have been conducted by EPA's Carcinogenic Assessment Group.

(b) Probability of exposure to a single detection of a contaminant in drinking water is low. Risk calculations for single detections were included in the maximum concentration category to assume a "worst case" scenario.

(c) Assumes all chromium present as the +6 ion.

Table 6.0

Summary of Eliminated Technologies

[Technology]	[Justification for Elimination]
Groundwater Treatment	**Evaluation of Technologies**
Biological Treatment	Contaminant concentrations are not high enough to support microbes
Storage	
Onsite storage	Not a long-term solution
Offsite Disposal	
Offsite Incineration	Costs are much higher than onsite incineration
Alternative Water Supply	
1. On-line filters	Difficult to determine if operating properly
2. Bottled water	Does not reduce risk from bathing, washing clothes and dishes
3. Community deep well	Potential to become contaminated from the site
Containment	
1. Asphalt Cap	Subject to cracking when placed over waste
2. Chemically stabilized caps	Subject to deterioration by organic solvents
3. Slurry wall	Not effective for bedrock aquifer
Groundwater Collection	
Collection galleries	Not cost effective for this site
Innovative Treatment Technologies	
1. Permeable treatment beds	Not cost effective for this site
2. Bioaugmentation	Much of the waste is not biodegradable
3. Solidification	Not suitable for the amount of organics on site
4. Chemical treatment	Not suitable for wide range of wastes on site
5. Vitrification	Unproven, costly technology, not suitable for the site

V. Alternatives Specifying Offsite Storage, Destruction, Treatment, or Secure Disposal of Hazardous Substances at a Facility Approved under RCRA

6. Excavate and dispose of contaminated waste deposits in an offsite, secured landfill currently in compliance with RCRA. Dispose, contain, or treat contaminated soil residuals underlying the waste deposits. Extract and treat ground water and provide an alternate water supply.

The above alternatives include some type of monitoring of soil and ground water contamination. All of the above alternatives, with the exception of the no action alternative, will require grading, erosion control, surface water diversion, fencing and revegetation. Alternatives 3, 4, 5 and 6 incorporate ground water pumping and treatment. Table 7 presents Alternate Concentration Levels (ACLs) developed by EPA for ground water criteria established to protect human health, aquatic life, and wildlife. The criteria presented will be reevaluated during design as additional sampling data and results become available from the pre-design studies.

Also, criteria for Tentatively Identified Compounds (TICs) and metals will be evaluated during design. All criteria were developed using EPA criteria or advisories and empirical scientific formulations (e.g., Freundlich isotherms). Ground water extraction, treatment, and discharge/ injection will also be subject to state and local regulatory agency restrictions.

Table 7

Alternate Concentration Levels (ACLs)
Ground Water Remediation Level

Compound	ACL (source) (ug/l/ppb)**
*vinyl chloride	0.015 (10^{-6} UCR)
*trichloroethene	1.8 (adjusted 10^{-6} UCR)
*1-2-dichloroethene	70 (adjusted 10^{-6} UCR)
*1,2-dichloroethane	0.95 (10^{-6} UCR)
1,1,1-trichloroethane	22 (HA)
*1,1-dichloroethene	0.24 (10^{-6} UCR)
*chloroform	0.19 (10^{-6} UCR)
*benzene	0.70 (10^{-6} UCR)
xylene	440 (HA)
toluene	2000 (HA)
ethyl benzene	680 (HA)
phenols	300 (taste)
phthalates	3 (aquatic life)

* Carcinogens
** ug/l = microgram perliter / ppb = parts per billion

Note: TIC criteria will be determined during design or predesign
° UCR - Unit cancer risk
° HA - Health Advisory Level

Most of the costs for the no action alternative are related to sampling and analysis. Capital costs for the no action alternative are estimated to be between $80,000 and $130,000. Annual sampling and analysis costs are estimated to be $197,700. The 30-year present worth of the costs for the no action alternative is estimated to range from $1,953,000 to $2,003,000.

II. Evaluation of Alternatives that Meet CERCLA Goals but Do Not Attain Other Applicable Standards

2. Onsite Capping of Contaminated Soils and Wastes; Extension of the Coatesville Water Authority Public Water Supply; and Long-Term Monitoring.

This alternative provides a source control remedy that meets the CERCLA objective of reducing the likelihood of present or future threat from the hazardous substances found at the site. The technologies used to meet the objective of this alternative are as follows:

- Provision of a soil cap to reduce the public health risk associated with dermal contact, ignition of the wastes or ingestion of the site's surface soil contaminants, and to reduce leachate generation, (but not reduce the concentration).

- Installation of a municipal water supply to reduce the potential health risks associated with consumption or utilization of contaminated groundwater.

- Implementation of a long-term monitoring program to provide data on the effectiveness of the remedial action and to detect any future contaminant migration from the site.

Site remediation will be initiated with the construction of 10 additional monitoring wells and the establishment of a grid matrix soil sampling and testing study. The additional monitoring wells will supply important groundwater quality, geologic, and hydrogeologic information that is needed to assess the site's groundwater conditions over time.

The soil sampling and testing study is based on data that is obtained from a 100-foot grid matrix laid out around the perimeter of the existing surface and subsurface sampling points that have contaminant levels in excess of the levels corresponding to a 10^{-6} health risk. Initially the grid matrix is used for soil gas sampling and screening purposes. Subsequent soil sampling of the grid will aid in defining the horizontal extent of the multimedia cap. The soil sampling grid will be expanded in both directions as the field data is gathered and analyzed.

The approximate area of capping is 9.37 acres. The actual construction and testing specifications will have to be prepared after the selected soil-cap material is tested and analyzed for slope stability and permeability characteristics. Soil or materials with a permeability within the range of 10^{-5} cm/sec are assumed applicable to this alternative.

Upon completion of the 10 new monitoring wells described previously, a monitoring program will be initiated to provide additional information about the extent of ground water contamination and the site's hydrogeology. After site capping is completed, the monitoring program will continue as needed and adjustments will be made to supply pertinent information about the site conditions. For costing purposes, all 21 monitoring wells are assumed to remain in service for the next 30 years and will undergo quarterly sampling and analysis for HSL contaminants.

Provision of an alternate water supply for the affected residents should result in no additional impacts to either residents or remediation workers during construction. It will also eliminate contaminated ground water use to those homes that tap into the system. Overall, corresponding potential risks are not eliminated entirely, however, as long as some homes remain on wells that possibly could become contaminated in the future. Long-term monitoring, therefore, would provide data to determine any changes in contaminant related potential risks to these well users over time.

Institutional issues related to installation of a public water supply are not expected to be complex. The City of Coatesville, of course, would have to approve the proposed connection. Construction of the system then must conform to state and local standards governing a public water supply.

Capital costs associated with all elements of this alternative are estimated to range from $2,706,000 to $4,812,000. The 30-year present worth of the costs is estimated to fall between $5,122,000 and $7,233,000.

III. Evaluation of Alternatives that Attain All Applicable or Relevant Standards, Guidance, or Advisories

3. Onsite Multimedia Capping of Contaminated Soils and Wastes; Extension of the Coatesville Water Authority Public Water Supply; Groundwater Extraction, Treatment, and Discharge/Injection; and Long-term Monitoring.

This alternative provides a source control remedy and a management of migration remedy that meets the CERCLA objective of attaining applicable and relevant Federal public health and environmental standards. The intent of this alternative is to attain the objective of a potential health risk no greater than 10^{-6} associated with the site contaminants. This alternative is a combination of the following remedial actions:

- Installation of a multimedia cap to reduce the potential exposure risks associated with dermal contact or accidental ingestion of the site's contaminated surface soils, and to reduce the volume of leachate generated by the site.

- Installation of a public water supply to minimize the potential health risks associated with ingestion or utilization of the site's contaminated groundwaters.

- Implementation of a long-term monitoring program to observe future contaminant migration, and provide data on the effectivenes of site remediations performed.

The ground water treatment system will be designed to handle primarily organic contaminants, exceeding Alternate Concencentration Levels (ACLs) at compliance points, however, if additional studies reveal inorganic ground water contamination, the treatment facility will be constructed to handle these contaminants as well. The first stage in the treatment system uses precipitation, flocculation, and sedimentation processes to pretreat the metals found in the ground water that could interfere with the organic treatment process.

The removal of the organic chemicals found in the site's ground water will be achieved through the use of an air stripping process to remove volatile organics, followed by carbon adsorption.

The ground water extraction and treatment system provides a feasible means of removing contaminants from the ground water. However, the efficiency of extraction is subject to the uncertainty of localized well yields due to the fractured bedrock. Ground water extraction is believed to be feasible for the following reasons: aquifer testing during the RI identified sustained yields with ground water being intercepted on every monitoring well. These wells averaged 70 feet in depth. The proposed pumping wells will be 150 feet deep, so yield should be greater. Even though the hydraulic connection between individual recovery wells may be unpredictable, the overall gradient can be controlled so that the ground water in fractures between the wells will eventually migrate toward the pumping well due to the pumping-induced gradient.

The treatment process is expected to be effective in removing ground water contaminants. Site-specific pilot testing and monitoring are required to assess the efficiency of the system prior to scale-up. A gaseous chlorinator may be needed once treatment commences if significant biological growth occurs on the packing media or GAC contactors. Pre-treatment should ensure that total suspended solids are low enough to prevent plugging of the media.

The potential exposures and corresponding health risks associated with residual contaminants will be reduced after completion of the multi-media cap. The alternate objective of cleaning the site to the same levels as the identified background levels is not attainable because the contaminants will remain on site in the waste deposits and in the soils.

Pumping and treatment of the contaminated ground water is intended to reduce the potential public health risk to a 10^{-6} risk Unit Cancer Risk or less.

The proposed multimedia cap will meet the RCRA regulations for closure of a facility (Closure and Post-closure Care 40 CFR 264.310).

Implementation of the ground water extraction and treatment system will require approval of state and local officials. Air pollution control equipment may be required on the air stripper to reduce gaseous emissions to acceptable limits. Permit requirements for air stripper emissions and ground water injection must also be met.

A controlled hazardous waste landfill must be double-lined and contain leachate collection and detection systems capable of removing leachate that may be produced. The landfill must be operated according to RCRA regulations listed under 40 CFR Part 264. A comprehensive ground water monitoring program must be utilized during construction and after landfill closure according to Subpart F of Part 264.

Construction and operation of a RCRA-specification landfill is a relatively new technology. Its effectiveness is highly dependent upon proper installation techniques, particularly with the synthetic membrane and the sealing thereof. Installation of the various landfill components, such as compacted soil and synthetic membranes, are widely used and accepted construction techniques. A geotechnical evaluation of the proposed landfill site should be performed during the design phase to ensure that the additional loading from the liners and waste material will not cause excessive settlement and stability problems. Installation of this alternative should take approximately 2 years.

A controlled hazardous waste landfill requires significant operation and monitoring systems. The leachate collection and detection systems require frequent inspection for leaks and clogging. The capping materials require periodic maintenance to prevent erosion and surface ponding.

Installation of a landfill would greatly increase the exposure risk (during installation) above that associated with a surface cap because all the contaminated soils will be excavated, stockpiled, and replaced.

Operation of the landfill will decrease the long-term risk of exposure and health effects to offsite receptors. The high degree of containment provided by a landfill built to RCRA specifications isolates the wastes from surface water and groundwater contact, thereby greatly reducing contaminated surface water runoff, groundwater infiltration, and offsite contaminant migration.

Installation of a controlled hazardous waste landfill includes many unknowns, such as actual amounts of contaminated soil, material costs, and site conditions during construction. The most critical factor is the volume of contaminated soil which directly affects the capital cost of the landfill. A sensitivity analysis was performed to determine the effects of variations of quantities of contaminated soils to be excavated, clay liners, and synthetic liner materials. These sensitivity factors range from -40 to +50 percent. The capital costs for this alternative range from $14,317,000 to $31,508,000. There is a significant amount of operation and maintenance costs associated with a landfill, including ground water monitoring, maintenance of the leachate collection system, and maintenance of the cover soil and vegetation. The total 30-year present worth is expected to range from $18,986,000 to $36,177,000.

The incineration process for this alternative is a mobile, rotary-kiln system. A 0.5 ton/hour unit will be used initially for any test burns necessary to meet RCRA requirements and to determine the most efficient loading rates for site operation. The PADER has already approved such a design. During this time, a second, larger unit (capable of processing 4 tons/hr of soils) would be built of similar design as the smaller unit. Since both units would have similar design and operating characteristics, no regulatory problems would be expected with this larger unit. It is estimated that this unit could be operating on site within one year after incineration commences with the first unit. Both units would be retained on site for a combined processing rate of 4.5 tons/hr for the duration of the project.

Incineration is a proven technology for destroying hazardous organic compounds in soils and municipal wastes. It may be effective for the destruction of these materials in certain areas at the Blosenski Landfill Site. Prior to commencement of incineration, however, pilot studies will have to be performed to determine the BTU content of the wastes/soils, percent ash, etc. The overall destruction efficiency of the incinerator must be greater than 99.99 percent. Certain materials suc as PCBs may not be incinerated on site due to special permitting requirements and the potential for generation of hazardous combustible byproducts.

This alternative as presented assumes that the residual incinerator ash will not qualify as a hazardous waste based upon the EP Toxicity Test Procedure as described in 40 CFR Part 261, Appendix II. If so, it can thus be delisted as a hazardous waste under RCRA and may be disposed of onsite under a multimedia cap as previously described. However, incineration will not destroy the heavy metals found in site materials. Because of the reduction in volume after incineration, the metals concentrations in the ash may actually be higher for a given unit mass of metals. This effect may be more pronounced in the waste materials than in the soils because of the greater volume reduction for wastes (approximately 80 percent) than for soils (negligible) after incineration.

In light of this, various options to capping the incinerator residuals should be considered. Assuming that the residual soils do not qualify as a hazardous waste based upon the EP Toxicity Test Procedure and the wastes do not, the soils can remain on site and be capped while the waste materials (approximately 37,000 cy) can be disposed off site in a secure hazardous waste landfill. A preliminary cost estimate for this option indicates that $8.8 million would be necessary in addition to the costs for the complete capping alternative.

If neither the wastes nor the soils pass the EP Toxicity Test Procedure, and the entire 231,000 cy of residual materials must be disposed off site, this alternative becomes similar to Alternative Six for excavation and offsite disposal (without incineration). The site would be backfilled with clean fill and revegetated, with an additional cost of $55.4 million over capping and leaving the ash on site.

A final option would be to build a RCRA landfill on site to dispose of the entire 231,000 cy of ash. Preliminary calculations indicate that using a landfill of similar design as in Alternative Four, an additional cost of $6.7 million would be incurred over the capping alternative.

5. Option - Complete Excavation of Contaminated Soils and Wastes; Onsite Incineration with Stabilization of Residuals; Extension of the Coatesville Water Authority Public Water Supply; Groundwater Extraction, Treatment and Discharge/Injection; and Long-Term Monitoring.

This alternative utilizes stabilization of the incinerator residuals in lieu of the placement of a multimedia cap, and will exceed applicable and relevant Federal public health and environmental standards. Because of the similarity to the Alternative Five for incineration, this discussion will focus only on the stabilization of incinerator residuals (ash) versus capping them.

The stabilization process that warrants further investigation for the metals-laden residuals is a pozzolanic process utilizing fly-ash and cement as the additives. The process can be either a batch or continuous operation depending upon the quantities of materials to be stabilized. Placement of materials can also be performed by one of two methods. In one method, water and a dust control material are mixed with the ash, and the resultant material stockpiled. Periodically (every few months), the stockpiled material can be placed, compacted, and allowed to "set up" until it has a form similar to concrete. The second method involves placing the ash as it is discharged from the kiln, and periodically injecting the material with the additives necessary for solidification. The second method is thought to be less expensive since there will be less materials handling involved. The determination of the most effective process for this site should be made by field or laboratory testing.

The solidfication process should tie up the metals in the ash to some extent, thus "fixing" them, although this should be verified during the design phase by laboratory analysis of a representative sample of ash. The resultant matrix should, however, be of high strength and low permeability (10^{-7} to 10^{-6} cm/sec), virtually eliminating leachate production.

The amount of contaminants leaching into the groundwater and surface water will be significantly reduced by this option, producing a corresponding reduction in potential exposure risks. State and Federal approval will have to be granted to allow disposal of incinerator ash on site by this method. The stabilized material will require delisting as a hazardous waste under RCRA by passing leachability testing in the laboratory.

Costs for this option were developed similarly to the basic Alternative Five. Differences in final costs are a result of replacing the costs for capping, backfilling, and compacting the incinerator ash (231,000 cubic yards) with the costs for stabilization (additives, mixing, spreading, and compacting costs provided by a vendor) and covering with the flow zone and topsoil materials included in this option. As such, the total capital cost for this option ranged from $30,378,000 to $43,258,000. The total 30-year present worth for this alternative ranges from $53,392,000 to $66,272,000.

The offsite disposal facility must be authorized under RCRA to receive the identified contaminated soils and waste. In addition, the facility must currently comply with RCRA groundwater monitoring requirements, and must have no unauthorized surface or groundwater discharges of contaminants. A facility inspection and document/records review will be necessary to verify satisfactory compliance status. The nearest offsite landfill believed to be in current RCRA compliance is operated by CECOS International, and is located near Buffalo, New York, approximately 450 miles from the site. Implementation of this alternative may require development by the regulatory agencies of an Alternate Concentration Limit (ACL) for determining the acceptable contamination levels that may remain in the residual soils.

For this alternative, three options were developed to address remaining contaminated soils, underlying the excavated wastes.

Option A is a continuation of this alternative. Contaminated soils are excavated and taken offsite for disposal in an approved landfill. The excavated areas are then backfilled with clean soil from a local borrow area. The backfill is graded and compacted to match as best as possible the surrounding topography, and then the area is revegetated. The remaining actions are constructed and a long-term monitoring program initiated.

Option B utilizes the construction of a multimedia cap over the contaminated soils to reduce the amount of infiltration. Since the remaining contaminated soils are believed to be above the groundwater table, the amount of leachate generated by the site should be reduced to near zero. The remaining remedial actions of this alternative can be completed in conjunction with this option.

Option C consists of a series of studies to evaluate the potential use of an innovative or emerging technology such as soil washing technology to detoxify the contaminated soils.

There are two contaminated media found at the Blosenski Landfill Site that might be detoxified by utilizing an innovative or emerging technology. They are as follows:

- Burned and unburned contaminated municipal solid waste (MSW), with crushed drums and drum residuals.
- Contaminated Soils

Option A

Capital cost estimates for this alternative option range from $89,388,000 to $257,503,000. The total 30-year present worth for this alternative is expected to be between $93,858,000 and $261,973,000.

Option B

Capital cost estimates for this alternative option range from $44,815,000 to $123,872,000. The total 30-year present worth for this alternative is expected to be between $49,484,000 and $128,451,000.

Option C

Capital cost estimates for this alternative option range from $45,756,000 to $126,006,000. The total 30-year present worth for this alternative is expected to be between $50,027,000 and $130,877,000.

Alternative Trade-Off Matrix

The trade-off matrix presented in Table 8 summarizes: the technologies comprising the alternatives; technical, public health, and environmental advantages and disadvantages and institutional considerations.

EFFECTIVENESS EVALUATION

COSTS

A summary of the range of capital, annual O & M, and 30-year present-worth costs for the remedial alternatives are presented in Table 9. Present worth costs is the amount of investment needed today to finance operation and maintenance necessary for each alternative.

Consistency With Other Environmental Laws

The six alternatives presented in this ROD were evaluated to determine consistency with other environmental laws such as RCRA, TSCA, and Clean Water Act (CWA) §404.

Only alternatives 3,4,5 and 6 comply with RCRA requirements for offsite groundwater plume abatement. RCRA also requires soil contamination be isolated or excavated to background levels unless mathemetical models illustrate safe levels which require no action. Alternatives 5 and 6 remediate soil and are thus in compliance with RCRA. All alternatives should be in compliance with CWA §404 since no alternative recommends the filling in of a wetland.

TABLE 8-2

Alternatives:	Technical Considerations: Advantages	Technical Considerations: Disadvantages	Public Health Considerations: Advantages	Public Health Considerations: Disadvantages	Environmental Considerations: Advantages	Environmental Considerations: Disadvantages	Institutional Considerations:
4. Onsite Landfill, Alternate Water Supply, Groundwater Extraction and Treatment, and Long-Term Monitoring.	- Relies on proven technologies.	- Efficiency of groundwater extraction is questionable due to fractured bedrock. - Effectiveness of landfill is dependent upon proper installation techniques. - Groundwater treatment entails extensive operation and maintenance.	- Reduces potential risk associated with dermal contact, ingestion, and inhalation.	- Increased exposure risk during implementation due to complete excavation.	- Eliminates future leachate generation. - Completely isolates the wastes from groundwater contact, surface water runoff, and airborne transport.	- Increased potential for airborne contaminants during implementation.	- Requires RCRA-permitted facility and comprehensive groundwater monitoring program. - Requires permit for groundwater discharge. - May require air pollution control equipment on air stripper to meet PADER requirements. - Requires approval from Coatesville Water Authority.
IV. Alternatives Exceeding Applicable or Relevant Standards							
5a. Onsite Incineration, Multimedia Cap, Alternate Water Supply, Groundwater Extraction and Treatment, and Long-Term Monitoring.	- Relies on proven technology.	- Onsite (mobile) units not widely available. - Available units have relatively low throughput, resulting in a relatively long implementation period (18 yrs). - Incineration entails considerable operation and maintenance. - Efficiency of groundwater extraction is questionable due to fractured bedrock. - Groundwater treatment entails extensive operation and maintenance	- Organic contaminants completely destroyed. - Reduces potential risk associated with dermal contact, ingestion, and inhalation.	- Increased exposure risk during implementation due to complete excavation. - Potential exposure risk of nearby residences due to incinerator stackgas emissions.	- Reduces inorganic leachate generation and eliminates organic leachate generation. - Reduces surface soil erosion and airborne transport of contaminants. - Reduces existing groundwater contamination.	- Potential transfer of volatile organics from groundwater to atmosphere. - Increased potential for airborne contaminants during implementation due to excavation, and due to incinerator stackgas emissions during operation	- Same as above, plus incinerator emissions must conform to NAAQS.

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Table 8-4

Alternatives:	Technical Considerations: Advantages	Technical Considerations: Disadvantages	Public Health Considerations: Advantages	Public Health Considerations: Disadvantages	Environmental Considerations: Advantages	Environmental Considerations: Disadvantages	Institutional Considerations:
Option A: Excavation and Offsite Disposal of Residual Soils.	- Relies on simple technologies.	- Efficiency of groundwater extraction is questionable due to fractured bedrock. - Groundwater treatment entails extensive operation and maintenance.	- Eliminates long-term potential risk due to dermal contact, ingestion, and inhalation.	- Increased exposure risk during implementation due to excavation and transport of materials.	- Same as above.	- Potential transfer of volatile organics from groundwater to atmosphere. - Increased potential for airborne contaminants during implementation.	- Requires finding a RCRA-permitted facility to receive this large quantity of materials. - Requires manifestation of materials in accordance with RCRA and DOT regulations. - Requires permit for groundwater discharge. - May require air pollution control equipment on air stripper to meet PADER requirements. - Requires approval from Coatesville Water Authority.
Option B: Install Multimedia Cap over Residual Soils.	- Relies on simple proven technologies.	- Efficiency of groundwater extraction is questionable due to fractured bedrock. - Groundwater treatment entails extensive operation and maintenance.	- Reduces potential risk associated with dermal contact, ingestion, and inhalation.	- Increased exposure risk during implementation due to excavation and transport of materials.	- Reduces surface soil erosion and airborne transport of contaminants. - Reduces leachate generation. - Reduces existing groundwater contamination.	- Potential transfer of volatile organics from groundwater to atmosphere.	- Requires finding a RCRA-permitted facility to receive this large quantity of materials. - Requires manifestation of materials in accordance with RCRA and DOT regulations. - Requires permit for groundwater discharge. - May require air pollution control equipment on air stripper to meet PADER requirements. - Requires approval from Coatesville Water Authority. - Requires RCRA permit for capping of wastes.

Table 9

REMEDIAL ACTION ALTERNATIVES COST SUMMARY ($1,000)
BLOSENSKI LANDFILL SITE

Remedial Action Alternative	Capital Costs			Annual Operation & Maintenance Costs Year No:				Present Worth Analyses (30 Yrs.)		
	Low	Base	High	1	2-5	6-16	17-30	Low	Base	High
1. No action with monitoring	80	100	130	197.7	197.7	197.7	197.7	1,953	1,973	2,003
2. Soil cap, alternate water supply and long-term monitoring	2,706	3,231	4,812	255	255	255	255	5,122	5,647	7,233
3. Multimedia cap, alternate water supply, groundwater extraction and treatment and long-term monitoring	8,481	9,550	13,037	825	816	276	276	13,150	14,226	17,706
4. Onsite landfill, alternate water supply, groundwater extraction and treatment and long-term monitoring	14,317	22,728	31,506	825	816	276	276	18,986	27,397	36,177
5a. Onsite incineration, multimedia cap, alternate water supply, groundwater extraction and treatment and long-term monitoring	26,113	29,424	32,207	1,503	3,194	2,654	234	47,858	51,169	53,952
5b. Onsite incineration, stabilization of residuals, alternate water supply, groundwater extraction and treatment and long-term monitoring	30,378	38,213	43,258	1,637	3,328	2,788	388	53,392	61,227	66,272
6. Excavation and offsite disposal of wastes in a RCRA-approved landfill, alternate water supply, groundwater extraction and treatment and long-term monitoring, plus:										
Option a: Excavation and offsite disposal of soils in a RCRA-approved landfill	89,388	173,285	257,503	804	795	255	255	93,858	177,735	261,973
Option b: Construction of multimedia cap over contaminated soils	44,815	84,118	123,782	825	816	276	276	49,484	88,787	128,451
Option c: Excavation and detoxification of contaminated soils	45,758	88,001	128,006	783	774	234	234	50,027	90,272	130,877

3) Perform a pre-design study which will include the installation of additional monitoring wells and conduct pump testing to more fully delineate the extent and magnitude of the ground water contamination. This study will also be used to collect data for the design of an effective ground water pumping and treatment system. Residential wells, surface waters and sediments will also be sampled during design to assist in determining the extent of contamination from the site and its potential impact to the environment.

4) Based on the findings of the pre-design study, a source reduction program will be implemented involving pumping and treating of contaminated ground water that exceeds Alternate Concentration Levels (ACLs) developed by EPA, for a specified period of time determined during design, not exceeding two years. During this initial period, the ground water pumping and treatment program will be evaluated to determine the effectiveness and technical feasibilty of reducing the ground water contamination to the EPA developed ACLs. Based on this evaluation, a determination will be made to continue the pumping and treatment program for another specified period using the proposed or new ACLs or to discontinue with ground water monitoring. This process will continue cycling until EPA deems it appropriate to discontinue pumping. This strategy is necessary because the effectiveness of pumping to reduce VOC contaminants to low part per billion levels over a long time period, is unknown. The proposed ACLs for the first period are outlined in Table 7. These ACLs will be reevaluated during design to ensure technical feasibility and protection of human health and the environment.

The groundwater will be treated to levels established in a National Pollution Discharge Elimination System (NPDES) program implemented by PADER and either discharged into the intermittent tributary north of the site and/or reinjected into the ground. Ground water may be treated for inorganic and organic removal by precipitation, filtration, air stripping and granular activated carbon. The NPDES permit will consider technical feasibility of treatment and protection of aquatic life and humans or wildlife which may ingest aquatic life, using CWA and USEPA Aquatic Water Quality Criteria and/or Pennsylvania State Water Quality Criteria or Standards.

When the decision is made to discontinue the pumping and treatment program a closeout sequence will be initiated to decommission the pumping wells and treatment facilities in a manner to mitigate post closure maintenance requirements.

Operation and Maintenance (O & M)

O & M costs are estimated to be approximately $534,300 for the first two years.

The components of the recommended alternative that may require O & M are:

- Landfill Cap
- Surface Water Management Systems
- Gas Venting System
- Monitoring (excluding that necessary to monitor the effectiveness of the pumping and treatment program while it is being financed by the Trust Fund).

The above listed items will be considered normal operation and maintenance and will be the responsibility of the State of Pennsylvania one year subsequent to completion of construction.

The ground water pumping and treatment program will be considered part of the approved remedy for a period of at least two years. If targets are not reached after two years of remedial activity the Regional Administrator will determine if it is technically feasible to reach those targets. If further pumping and treatment are required, this will also be considered as part of the approved remedy and eligible for Trust Fund money up to ten years with 10% financed by State money.

Estimated Schedule *

Approve ROD	9/86
Start PreDesign	11/86
Complete PreDesign	5/87
Award Superfund IAG to US Corps of Engineers for Design	11/86
Start Design	5/87
Design Complete	10/87
Award Construction Contract	2/88
Start Construction	4/88

* Dependent upon CERCLA reauthorization

1. OVERVIEW.

On Thursday July 31, 1986 EPA conducted a public meeting to announce the Agency's preferred remedial action and to discuss the Remedial Investigation, Feasibility Study and the Focused Feasibility Study for the Blosenski Landfill Superfund Site. The documents were placed in the repository at the West Caln Township Building in June, 1986. An announcement of the public meeting was made by sending a press release to the local media, which includes West Chester and Coatesville. The public comment period closed on September 11, 1986.

The Agency's preferred alternative includes three phases:

Phase 1.: Install a public water supply provided by the Coatesville Water Authority to an estimated 12 residents.

Phase 2.: Excavate and remove buried drums in areas identified during EPA's Remedial Investigation and any material in intimate contact with the drums and free standing liquid, and dispose of these materials at a Resource Conservation and Recovery Act (RCRA) facility. In addition, EPA will perform trenching operations throughout other areas of the Site in order to identify, excavate and dispose of other buried drums.

Phase 3.: Perform a pre-design study which shall include sampling of residential wells, surface waters, and the installation of additional monitoring wells and conducting pump testing to more fully delineate the extent and magnitude of the groundwater contamination. This study will also be used to collect data for the design of an effective groundwater pumping and treatment system.

Phase 4.: Install a low permiability cover on the landfill in accordance with the requirements of RCRA. Construct appropriate surface water diversion systems. Construct a gas venting system to protect the cover. A monitoring program will be conducted at these gas vents and treatment of the off gases will be provided if needed. Institute periodic monitoring for ground water and surface water contamination in the landfill area in compliance with RCRA closure regulations. This will include sampling of potentially affected residential wells in addition to surface water sampling.

At the RI/FS public meeting, several questions relating to the EPA preferred alternative were raised. The following is a list of questions asked by the residents who attended the meeting. EPA responses to those questions are given as they were answered at the public meeting.

Phase 1, Water Line Installation

1. Have you decided which residences will receive water from the City of Coatesville?

The EPA will not prevent anyone from connecting to the water line. The people should address that question to the Coatesville Water Authority. That means more customers for the water authority, and they would probably want to know that others are interested so that the line can he properly engineered.

7. Have the families who will be connected to the water line by the EPA been informed of this?

   The EPA does not know who all of the potentially affected families are at this time, but those families will be notified as soon as the determination is made.

8. How reliable have the EPA's predictions about potentially affected parties been in the past?

   Hopefully, enough monitoring wells will be installed to determine "potential" accurately. The EPA will be very conservative in its predictions and will look at it as a worst case senario and then act accordingly.

9. Wouldn't it be a good idea to put the water line in right away?

   The people whose wells are contaminated are already on bottled or filtered water, but as soon as money is available, the water line will be installed.

10. The EPA will extend the water line. Do individuals have to pay to run the pipe from the street to their homes?

    The EPA will pay for the initial connection.

Phase 2, Drum Excavation

1. In the landfill area, is it known how deep contamination has gone?

   The site is not homogeneous. In some areas, it has been excavated and backfilled. In other areas, the bedrock has been exposed. In some areas bedrock is 15 to 25 feet deep. The contamination that we have found is in pockets in the drum areas, and it is 12 to 15 feet deep.

Health Concerns

1. What can you tell us about the specific health hazards of contaminants from the site?

   The contaminants migrating from the site include trichloroethylene, trichloroethane, and dichloroethylene. These are all very similar compounds. They are basically just a 2 carbon molecule with double bonding between them and substitute chlorides on the carbons. They are all used as industrial degreasers. They are of concern to EPA because, in the long run, they can cause cancer. The ability of these compounds to cause cancer is not only a property of the chemical but is also a matter of how much of the compound is present.

2. Is the health risk only from drinking the water?

   The risk is from drinking the water, from inhaling vapors from the water during showering, and from allowing the water to contact your skin. All of those risks exist but not at equal levels. Ingestion poses the greatest risk. The risk from showering is about 1/3 the risk of drinking, but of course, it depends on how long the shower is and how hot it is and also on how well ventilated the room is. The risk from dermal contact is about 1/10 the risk of drinking the water.

3. Are the aged or the very young more susceptible than a healthy, young person?

   That's a very good question. The way the guidelines are set, the most sensitive members of the population are protected. So, if the entire nation was drinking trichloroethylene, at 2 ppb - say 200 million people - for a lifetime, the portion of that population that would most likely get cancer would be the aged and the young. That would still be only about 400 cases over a lifetime.

Enforcement

1. How long will it take for the PRPs to clean up? Isn't Blosenski the one who is responsible, and does EPA have to go through the process of suing the PRPs?

   Negotiations are in progress now. Mr. Blosenski is one of the PRPs, but he is not the only PRP. Any generators or haulers of wastes at the site, as well as any past or present owners, are also PRPs.

you feel another alternative would be more effective. A complete investigation was performed to develop this alternative. This is the public's chance to put their words intothe final document, and the PRP's can also comment. In the end, though, it will be the EPA who makes the decision.

4. Who makes the decision on the final alternative selections? Is it a financial decision?

After public comments are received, a document known as a Record of Decision (ROD) will be written. The ROD will describe the preferred alternative, and it will be reviewed by several people at the EPA, including EPA headquarters personnel, and by the state. The final decision is delegated to the EPA Regional Administrator.

2. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS.

The Blosenski Superfund Site is a 13.6 acre landfill in rural West Caln Township, Chester County, Pennsylvania. Operating from the 1950's until it was closed by the Pennsylvania Department of Environmental Resources in 1979, the landfill was used as an open dump for municipal and industrial wastes. At the time of closure, the site was owned by Joseph M. Blosenski, Jr. who had purchased it during the 1960's from Perry Phillips, the site's original owner. The landfill was unlined and unpermitted throughout its operating history.

Private wells are the source of drinking water for the residents in West Caln Township. Land uses in the area are residential, commercial and agricultural. The southern border of the site along State Route 340 is a residential area. While the site was in operation, numerous citizens expressed concern that the odors and airborne debris related to the open burning of waste at the site were responsible for various minor ailments, such as skin rashes. When the landfill was closed, the complaints decreased, but the citizens remained aware of environmental issues in the area. In December, 1982 the site was added to the National Priorities List.

In 1984, EPA conducted a community assessment around the site by going door to door to interview the residents. Although no organized citizens group is formed, the residents have a number of concerns. Among their main concerns, is the quality of groundwater in the area. Although remedial actions may stabilize groundwater quality, residents want to see the aquifer restored to an uncontaminated state. They are apprehensive of the long term effects of drinking even minimally contaminated water. They have also expressed concern about the safety of using their well water for laundry or bathing prior to the completion of remedial actions.

A. COMMENTS FROM RESIDENTS.

1. Three residents commented that remedial alternative 5 or 6 would be a better choice.

   At the public meeting, EPA explained that we would not be able to excavate the entire landfill and dispose of it in an offsite facility. That choice would not be technically feasible, or cost effective.

2. Only one resident wrote that they were not in favor of the water line proposal. That resident suggested drilling a new well.

   EPA explained at the meeting, that the residents had the option of accepting the water line connection. Those who preferred to continue using well water would not be forced to connect to the water line.

3. Three comments agreed with the entire EPA alternative.

4. Four letters agreed with Phase 2 and Phase 3 of the EPA preferred alternative.

5. Six of the residents letters agreed with the water line extension, and two of those asked EPA to pay their water bills.

   EPA explained that the purpose of Superfund was to address abandoned toxic waste sites across the country, and if migration from a site causes a potentially health threatening situation, procedures will be taken to remediate the threat.

   The option to connect to the water line will be made available to the affected and potentially affected parties, but EPA does not have the authority to insist that they accept the water line.

B. COMMENTS FROM LOCAL OFFICIALS.

1. The West Caln Township Board of Supervisors commented that they thought the RI/FS was too lengthy an investigation, and that the projected cleanup operation should have a proposed time schedule.

   A time schedule for the clean-up will be detailed in the pre-design study.

Comment: Failure to identify and evaluate non-site potential sources of contamination and correlation of on- and off-site compounds;

Response: The correlation between contaminants found on site (in soils and in drums samples) with those found in ground water is strong and is sufficient to show the landfill to be the cause of ground water contamination in the area. The possibility of other sources being responsible for some of the contamination found in certain offsite wells has not been ruled out and will be investigated further during pre-design studies; however, this possibility would not significantly alter our conclusions based on the onsite ground water data contained in the RI. This correlation is made strong by the evidence of similar compounds being detected in different sample types, and by the concentrations of contamination found in waste, soil, and ground water samples. The contribution by other sources, therefore, becomes negligible in light of the gross contamination which has been shown to be a direct result of the disposal of hazardous substances in the Blosenski Landfill.

Comment: Inadequate soil contamination data to support a trenching program and the need for excavation of contaminated waste/soil;

Response: The EPA selected alternative specifically addresses removal of drums and contaminated material in intimate contact with the drums from the landfill during trenching operations and not contaminated waste/soil. Trenching operations performed on the site during the RI were successful in locating areas of buried drums and pooled liquids containing hazardous contaminants. Because the RI identified these source areas as containing high concentrations of contaminants, EPA feels that it is necessary to locate, excavate and dispose of these drums to ensure drums containing contaminated materials, that are currently leaking into the subsurface soils and ground water, are removed. In addition, unopened drums containing contaminated materials, that may eventually rupture and release their contents into the environment, will also be removed. EPA may evaluate alternative technologies to treat the contents of these drums after excavation. The trenching operation will attempt to employ geophysical techniques to assist in isolating pocketed areas of drums, however, some of these techniques were employed during the RI without much success.

Comment: Preferred alternative remedy of overlapping and unnecessary levels of remediation;

Response: The EPA selected alternative addresses multiple health and environmental concerns caused by the contamination from the landfill. Because of these concerns and the actual and potential threat to human health and the environment, EPA feels that a number of remedial measures are necessary at the site to (1) eliminate the public health threat posed by the use of contaminated ground water by area residents, (2) eliminate contamination source areas to the maximum extent possible, (3) reduce and/or eliminate the potential for infiltration of contaminants into the environment, and (4) reduce levels of existing ground water contamination.

Comment: The preferred alternative calls for ground water treatment in fractured bedrock, the necessity and feasibility of which is seriously questioned;

Response: The results of the RI show that the ground water underlying landfill and some offsite areas is grossly contaminated with a variety of volatile organic compounds, many of which are carcinogenic. In addition, results of surface water sampling during the RI and subsequent sampling episodes performed by EPA indicate that these same compounds are migrating offsite via ground water movement. As stated in the FS, ground water extraction and treatment provides a feasible means of removing contaminants from the ground water. However, the Agency recognizes the efficiency of extraction is subject to the uncertainty of localized well yields due to the fractured bedrock. Because of this situation, EPA has selected an approach in which the pre-design study will be used to assess the extent and magnitude of ground water contamination and assist in the development of a source reduction program that will be implemented to reduce ground water to Alternative Concentration Levels developed by the Agency, for a specified evaluation period.

Comment: Cost effectiveness of extending the waterline;

Response: As expressed in former comments, the ground water data provide solid evidence that the ground water aquifer is contaminated and presently affecting residential wells. At the present time, at least three residences that are in close proximity to the landfill have contamination in their wells that the Agency considers to be an immediate health threat. Preliminary indications from ongoing sampling of the residences around the landfill show that as many as 12 to 18 residences may have some type of volatile organic compounds in their wells. Based on the hydrogeology and contaminant information provided in the RI, the Agency feels that there exists a potential for other wells directly adjacent to the site and wells in close proximity to the site to become contaminated, if they have not been so already. EPA is continuing its efforts to identify and evaluate affected residential wells. Because of this situation, EPA has elected to provide affected residences with an alternative water supply that will eliminate their contact with contaminated ground water. As referenced in the FFS, a variety of alternatives were explored that would provide adequate protection for affected residential wells. The Agency reviewed the development of a new community well initially as a favorable alternative. However, the alternative was eliminated due to a number of uncertainties associated with this alternative such as: the ability of the fractured rock system to provide enough water to affected and potentially affected residences; the responsibility and cost of long term operation and maintenance of such a system; the possibility of future contamination of the well from the contaminated aquifer; responsibility and future costs of easement agreements and/or permits; and the overall hydrogeologic effect on the surrounding area or community.

COMMONWEALTH OF PENNSYLVANIA
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Bureau of Waste Management

717-787-9871

September 26, 1986

Mr. Thomas Voltaggio
Chief, Superfund Branch
U. S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107

Dear Mr. Voltaggio:

The review of the draft Record of Decision for the selection of the alternative for the remediation of the Blosenski Landfill site has been completed. We concur with your assessment of the proposed alternatives and with the selection of the final remedial measures set forth in the draft ROD.

A branch water line will be installed from an existing mainline of the Coatesville Water Authority to supply alternative water to affected and potentially affected residences. A trenching operation of the landfill will be performed to excavate and remove the buried drums, any material in intimate contact with the drums, and the free-standing liquids for disposal at a RCRA facility. A low permeability cover will be installed on the landfill with appropriate surface water management and gas venting. Groundwater and surface water monitoring will be instituted in compliance with RCRA closure regulations. The remedial design, based on information obtained during trenching and excavation operations, will be in accordance with all applicable RCRA requirements, and will provide necessary environmental protection consistent with CERCLA goals.

A pre-design study will be performed to more fully delineate the extent and magnitude of the groundwater contamination and to collect data for the design of an effective groundwater pumping and treatment system. The groundwater contamination source reduction program will be implemented for a period of time determined during design but not to initially exceed two years. At the end of two years, an evaluation will be conducted to determine the effectiveness of the pumping and treatment system and the need, extent, and duration of future groundwater remediation.

Pre-design and design costs will be funded 100 percent by trust fund monies. The groundwater pumping and treatment program will be considered part of the approved remedy and will be eligible for trust fund money and 10 percent financed with State money. Operation and maintenance will be implemented by the State of Pennsylvania on the landfill cap, gas venting, surface diversion system, and monitoring program (excluding that necessary to monitor the effectiveness of the pumping and treatment program while it is being financed by the trust fund) one year subsequent to completion of construction.

We recommend that the installation of the public water supply and performance of the pre-design study proceed as quickly as possible.

The hydrogeological study perfo ed duri ted by the geologic investigation and al involv sampling of monitoring wells. These of the landfill and at upgradient a shows the location of the monitoring the results of analyses of ground wa wells were then used to observe grou in water levels over the course of th a means to perform hydraulic conductiv localized areas.

Samples of the ground water were obtained from these wells on several occasions throughout the RI, as well a residential wells in the area, for analysis of Hazardous Substance List (HSL) compounds and other water quality indicators.

Numerous HSL volatile organics we from both monitoring and residential Landfill site. Volatile contaminants include some contaminants identified surface soil, surface soil some not detected in other environment media at this site. identified in the ground water and th in monitoring wells are listed in Tab residential wells are listed in Table

Table

Monitoring We

Chemical
benzene
toluene
ethylbenzene
total xylenes
chlorobenzene
1,1,1-trichloroethane
1,2-dichloroethane
1,1-dichloroethane
chloroethane
tetrachloroethene
trichloroethene
1,2-dichloroethene
1,1-dichloroethene
vinyl chloride
chloroform
methylene chloride
acetone
2-butanone
2-hexanone
4-methyl-2-pentanone

*parts per billion

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